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A BRIEF STUDY OF A CASE OF ELEPHANTIASIS AND ITS HISTOLOGY.

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Having a personal acquaintance with a case of this disease and some preparations therefrom, a brief account of it may be of interest. The microscopical side of elephantiasis is almost entirely overlooked, which is, I suppose, on account of the disease being to a great extent tropical and the poor attention paid to hardening the specimens and being sent in the majority of cases to England or Europe.

Some of the synonyms applied to this disease are elephantiasis arabum, elephant-leg, bucnemia tropica, morbus elephas, pachydermia, Barbadoes leg, etc. The term is applied to two distinct diseases, *E. arabum* and *E. græcorum*, or true leprosy, from the shapelessness of the limb affected and its likeness to an elephant's foot, being derived from *Ελεψαυτίαδις* from ἐλέψας, the elephant; it is also a term applied to a cutaneous disease of oxen. The best and earliest descriptions of it we have from the Arabian physicians.

The varieties are many and may be found very well described in the "Lexicon of Medicine and Allied Sciences," vol. ii, of the New Sydenham Society publications. Some authors consider *E. lymphangeiectodes* (lymphangeiectasis) a variety of elephantiasis, and no doubt it is very closely allied. *E. arabum* is an enlargement of some part of the body, usually a limb, due to hypertrophy of the whole of the connective tissue, following an inflammatory condition of the part, whether to varicose veins, chronic eczema, ulcers, lupus or syphilis, or to any condition producing compression of the veins and lymphatics, such as exostosis, enlarged glands, or old standing dislocation. But although these local causes can produce elephantiasis—the hypertrophic conditions of connective tissue and morbid anatomical appearances of which are identical with those observable in the disease under consideration—elephantiasis arabum signifies far more, and differs altogether from simple hypertrophy as seen in this country, while at the same time it must not be confounded either with *El. græcorum*, which is true leprosy, or *E. italica*, another name for pellagra. *E. arabum* is dependent on a variety of climacteric conditions and is endemic in tropical countries. It affects males more than females, poorer and ill-fed classes than the well-nourished and those who live in a true hygienic state. No race of men is entirely exempt from the disease, which is, however, far more common among the dark than the fair race, and but seldom attacks Europeans. Some authors believe it due to a minute worm known as *filaria sanguinis hominis*, which blocks the lymphatics and sets up inflammation, and it has been suggested that all elephantiasis (which is largely lymphatic in structure) may be parasitic. The same parasite causes immense enlargement of internal lymphatics, and the appearances thus produced precisely resemble those of the unexplained lymphangeiectasis; and we may as well briefly mention this disease, having several specimens, as it is almost regarded as a variety of elephantiasis, if not quite so.

In pathology lymphangioma are considered as being of two kinds, lymphangeiectasis and cavernous lymphangioma, and they are very difficult to distinguish from one another.

Lymphangeiectasis is a tumor consisting of a mass of dilated lymphatics which have a varicose outline. The shape of tubes is preserved to a great extent, but often the vessels become transformed into cavernous spaces. They are soft, elastic swellings, which, when punctured or ruptured, spontaneously exude lymph. If you treat the lining membrane of the spaces with nitrate of silver when fresh the endothelium, so characteristic of lymphatic vessels, is soon found (see Fig. 4). These inflammations, with œdema and lymphangeiectasis, end in elephantiasis of the tissues and, according to Lewis, are the result of the filariæ.

The theory of the relations between the filariæ and elephantiasis arabum is both ingenious and interesting. As long ago as 1866, Wucherer, of Brazil, detected the embryoes of a special entozoon in the urine of a patient suffering from chyluria. Unaware of this discovery, Lewis, of Calcutta, in 1868 called attention to his own observations of a like kind, and in 1872 announced the filariæ appearing in the blood of a patient with *E. arabum.*

In 1875 Patrick Manson advanced the opinion that the inflammation caused by the parasite in the blood obliterated the lymphatic vessels, perhaps even the thoracic duct, and, arresting the lymph current, caused hypertrophy. In 1877 some eminent scientists, among them Bancroft (Australia) and Spencer Cobbold, came to the conclusion that there was evidence that the elephantiasis arabum was spread by the agency of mosquitoes, who take up the filariæ with the blood they suck. The filariæ pass through an intermediate developmental stage in the body of the mosquitoe, thence into the water, and then into the human body, and this is now the generally accepted theory and seems to harmonize with many facts. Again, facts seem, however, to show that *E. arabum* may exist without filariæ and *vice versa*, and so we can hardly feel very secure on such evidence.

The case of Thomas F.,* aged 62, miner, who had not worked for seven years, was diagnosed as elephantiasis of the hand, following a severe burn. The patient presented a feeble, pasty, cachetic appearance, and had albuminuria. Some ten years ago his clothes caught on fire while drunk. He sustained severe burns of the right arm from the wrist to the shoulder. He was treated as a patient of an infirmary for seven months, but the burns never cicatrized entirely. It had suppurated for a long time, and when he had been under treatment three or four months and the hand gradually healed, it began to swell and hypertrophy of the tissues took place. Attempts were made to stop the swelling by bandages and position, but without avail. The hand continued to increase in size up to the time of his admission into the hospital. He never suffered much pain in the hand, but a great deal in the arm. Amputation had been previously proposed, but it was refused. He was told this was his only chance of life and, notwithstanding the albuminuria, it was determined, if consent could be got, to remove it. After some consideration he consented, and after the preliminary treatment of liberal dieting, with a stimulant, the arm was removed at the junction of the upper with the middle third, it being necessary, as the skin above the elbow was involved. The patient was very feeble for a few days, although there was very little blood lost. He recovered, and the wound healed almost by first intention. The patient was seen four years after through requiring treatment for a bad dog bite in the left arm, from which no bad effects have appeared up to the present time (1891).

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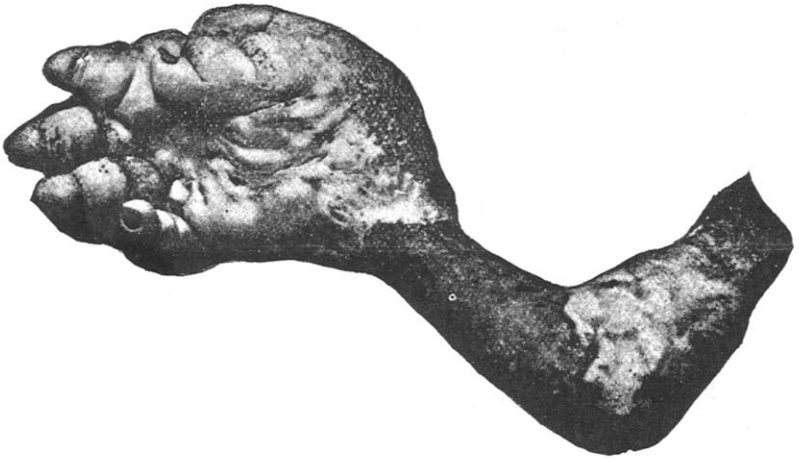
* This case was an Englishman, white.



The greatest circumference was 16½ inches; weight, 6 pounds 13 ounces. Several pieces of the growth were removed and hardened in chromic acid, ⅙ per cent.; others in bichromate of potassium, 2 per cent., and specimens stained in eosin and logwood, picrocarmine and logwood, and logwood. Aniline blue is also a useful cellular stain. The cells are well preserved, the softer tissues being easier to show the connective tissue cells than in the ordinary normal fully developed fibrous tissue. The corium is much thickened and indurated; the subcutaneous connective tissue greatly increased; in some parts dense and glistening, in others soft and gelatinous; the muscles softened and yellowish; the fascial, intermuscular tissue and periosteum much increased; the veins dilated and in places plugged by clots, and spaces here and there having clear lymph. Under the microscope, with oc. A (Beck's) ½ inch and ⅙ inch and Zeiss $\frac{1}{12}$ hom. immersion, N A 1.29, the sections showed the epidermis and papillary layer raised in rugæ, which are very prominent. In these masses the epidermic horny layers are much thickened, the rete malpighii or mucosum cells pigmented here and there, and the papillæ greatly increased in size; the corium bundles of connective tissue increased in thickness, swollen, gelatinous, and of a glistening appearance. Some fusiform and stellate cells are seen between them in places. The subcutaneous tissue runs as felted bands, fibrous and dense, and appears as if fused into the corium; in other parts it is loose areolar and embryonic connective tissue, pervaded by darkly stained cells, with nuclei scattered singly and well shown, in this case merging into the faciæ and areolæ. The muscles, from fatty degeneration and atrophy, are whitish, and often lose their true striated fibers, which are replaced by a fatty and granular débris, while the nerves show very slightly, as they appear compressed, indurated, and atrophied. The blood-vessels show a fairly normal position, except they are more open, through the increase in the connective tissue. The veins are dilated, thicker, and sometimes thrombosed, and later are indicated only by pigmented fibrous cords. The lymphatics are dilated and form small cysts; the walls, though thickened, are somewhat thin and brittle. The interstitial lymph spaces are seen very decidedly enlarged; here and there are spaces of every kind filled with clear lymph or gelatinous embryonic connective tissue. The flat endothelium show plainly when treated with $AgNO_3$ in a specimen freshly stained.

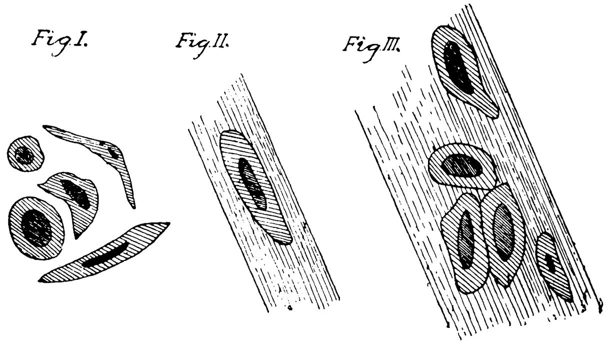


Fig. 1.—× 500. Cells scattered through different parts.

Fig. 2.—× 500. Cells lying on loosely connected bundle of fibrous tissue.

Fig. 3.—× 500. Cells in midst of tissue having an endothelial (epithelian) arrangement.

The hair follicles, sweat and sebaceous glands much elongated and widely separated, but otherwise little altered, in the early stages of the disease, become later compressed, shrunken, and atrophied, so as to be scarcely visible in many places other than a faint line.

In looking over the literature on the subject I find very little relating to the microscopical structure. The chief articles are by Dr. George Thin, of London, and one by Sir Joseph Fayrer and Mr. D'Arcy Power, both in the Transactions of the Pathological Society of London. For the account of the filaria several articles are to be found in the same transactions, a list of which will be given at the end of this article.

Fig IV

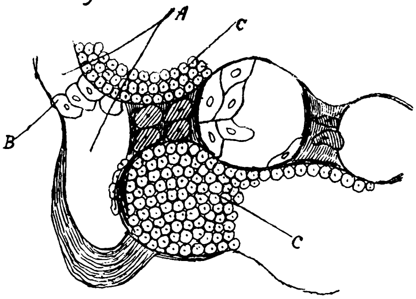


FIG. 4.—Dilated lymph vessels in elephantiasis (of skin). (*a*) lymph vessel ; (*b*) flat endothelium of vessel ; (*c*) embryonic connective tissue of the disease.

FIG. 5.—Rindfleisch, on p. 378. Figure is like the specimen under examination.

Dr. Thin, in his description of a case of elephantiasis relating to the multiplication of cells by division, could find no such appearances, and as all transition stages were found between the cell resembling a lymph-corpuscle and the largest endothelial cells, he infers that the whole of the cells present are derived from the white blood corpuscles of the blood. These appearances do not support Rindfleisch's statement that the cells multiply by division, nor Hebra and Kaposi's researches in their text-book in this connection. These authors remark that stellate cells with one or two nuclei, and with processes which are continued as fibers, are found in elephantiasis tissue. Dr. Thin thinks this is due to successful hardening, which has preserved both the cell and the nucleus entire, permitting the contour of the cell to be preserved as an element distinct from the tissue on which it lies. Scattered through the tissues are many groups of smooth, muscular fibers of new growth.

Cornil and Ranvier remark that groups of smooth muscle have been described by some authors in elephantiasis growth, but Dr. Thin has not found any allusion to the fact in the works of Rindfleisch or Hebra. The nature of the cells found in elephantiasis has a bearing on the important question of the nature of connective tissue cells in the normal tissues and their relation to the *substantia propria* or ground substance. Histologists are not agreed as to what constitutes the connective tissue cell, which is variously described as a branched element with anastomosing processes (Virchow, Stricker, Spina), as an element compounded of a central plate with fringes or wings (Waldeyer), as a flat cell with and without processes (Ranvier and his school and Klein), and as a flat, somewhat rounded cell (Key and Retzius). Thin, in the Proceedings of the Royal Society, No. 155, 1874, described connective tissue cells of the subcutaneous tissue as a rounded or somewhat oblong, flat, endothelial cell without processes, and arranged cell to cell like endothelium. The cells in elephantiasis tissue are analogous to the cells described in that paper, being flat, unbranched, and applied to the surface of the bundles of tissue, but not incorporated with the fibrillary substance. The endothelial arrangement can be well shown in a freshly killed mouse and injected interstitially with $AgNO_3$ while warm, as advised by Dr. Thin.

For a good résumé of the disease and particulars as to the history and treatment, etc., the paper by Sir Joseph Fayrer is, I believe, the most complete published. These notes are very brief and incomplete on account of lack of material and the difficulty in obtaining it in a good condition.

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